PATENT SPECIFICATION

678,677

Date of Application and filing Complete Specification: April 9, 1951.

No. 8206/51.

Complete Specification Published: Sept. 3, 1952.

Index at acceptance:—Class 7(ii), B2r1a.

COMPLETE SPECIFICATION

Connecting Rod Assembly for an Internal Combustion Engine

We, LEON HARVEY FEMONS and LAURA REYNOLDS FEMONS, citizens of the United States of America, and whose post office address is 1495, West Harding Way, Stockton, California, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to an internal combustion engine of the kind having a piston which is reciprocated in a cylinder and a crank shaft which is disposed in a crank case and is rotated by means of a crank which is connected to a connecting rod extending from the piston.

An object of the invention is to provide a connecting means between the connecting rod and crank which results in a relatively great horse power output in relation to piston displacement; causes the engine to run smoothly; permits of low idling speed; and assures of quick pick-up when desired.

A further object of the invention is to minimise side thrust by the piston on the cylinder walls, thereby reducing wear on such parts; the connecting rod reciprocating in substantially a straight path at all times.

According to the invention, the connection between the crank and the connecting rod comprises a bell crank lever and a link arm pivotally connected between the crank case and the elbow of the bell crank, one leg of the bell crank being journalled on the crank pin of the crank and projecting substantially vertically therefrom, or parallel to the longitudinal axis of the cylinder, when the piston is at the beginning of its power stroke and the other leg of the bell crank then projecting at right angles to the first leg and in the direction of rotation of the crank, and being connected to the lower end of the connecting rod.

[Price 2/8]

Thus, it will be seen that there is a three-point connection between the connecting rod, the crank shaft, and the crank case. Also the design is such that the crank shaft can be laterally offset relative to the cylinder, whereby to give an advantageous down-thrust to the crank from the connecting rod through the arrangement of interconnecting parts.

In order that the invention may be easily understood and readily carried into effect, an internal combustion engine having a piston rod-crank connection in accordance with the invention is illustrated, by way of example, in the accompanying drawings, in which:

Figure 1 is a transverse section of a one-cylinder internal combustion engine embodying the connecting rod assembly; the parts being shown in the position occupied thereby at the beginning of a power stroke.

Figure 2 is a similar view, but shows the position of the parts at the end of a power stroke.

Referring to the drawings, the numeral 1 indicates generally a one-cylinder internal combustion engine, although obviously the invention may be used in multi-cylinder engines.

The engine 1 includes, as conventional parts, a cylinder 2 mounted on top of a crank case 3, and a piston 4 reciprocable in the cylinder 2. Additionally, the engine 1 includes a valve unit 5 actuated by a cam shaft 6 rotated by a drive, indicated generally at 7.

The crank shaft of the engine is indicated at 8, and the cam shaft drive 7 is coupled to said crank shaft.

In the above described engine there is embodied the connecting rod assembly, as follows:

At the outset it should be noted that the crank shaft 8 is offset laterally from the axis of the cylinder 2; such crank shaft 8 including a crank 9 having a crank pin 10.

The numeral 11 indicates a bellcrank lever whose legs are identified at 12 and 13.

The leg 13 of the bellcrank lever 11 is coupled, at its free end, to the crank pin by a bearing 14, and extends from the crank pin substantially vertically or parallel to the longitudinal axis of the cylinder.

The other leg 12 of the bellcrank lever 11 extends at right angles to the leg 13 and the said leg 12 is coupled, at its free end, by a cross pin 15 to the lower end of a rigid connecting rod 16 which extends upwardly into the cylinder 2, and is there secured in the piston 4 by means of a conventional gudgeon pin 17.

The direction of rotation of the crank shaft is indicated by an arrow in each Figure of the drawings, and it should be noted that the leg 12 of the bellcrank lever 11 projects from the leg 13 generally in the direction of said rotation. The legs 12 and 13 of the bellcrank lever 11 are of substantially the same length.

The bellcrank lever 11 is pivotally connected, at its elbow, by means of a cross pin 18 with one end of a rigid link arm 19. The link arm 19 extends from the bellcrank lever 11 in a direction generally opposite the leg 12, and at its outer end said link arm is pivotally mounted by a cross pin 20 secured in connection with a boss 21 on the adjacent side of the crank case 3.

With the connecting rod assembly above described, a very beneficial and effective leverage or thrust is attained upon the down stroke of the piston 4 and connecting rod 16, by reason of the fact that the crank shaft 8 is laterally offset relative to the axis of the cylinder, as shown and described.

Additionally, the combination of the bellcrank lever 11 and link arm 19, as mounted with the described three-point connection, results in the crankshaft 8 turning through approximately 240° on the power stroke and approximately 120° on the exhaust stroke. In other words, the piston 4 travels twice as fast on the exhaust stroke as it does on the power stroke: this being a beneficial feature in an internal combustion engine. With the arrangement the engine has a low idling speed and quick pick-up, with maximum power in relation to its displacement.

The path of travel of the respective parts of the connecting rod assembly will be obvious, but it is of importance that the connecting rod 16 travels generally in a straight path with little swinging motion about the axis of the gudgeon pin 17. The result is that wear between the piston 4 and cylinder 2 is minimised.

What we claim is:—

1. In an internal combustion engine of the kind set forth, connecting means between the crank and the connecting rod which comprises a bell crank lever and a link arm pivotally connected between the crank case and the elbow of the bell crank, one leg of the bell crank being journalled on the crank pin of the crank and projecting substantially vertically therefrom, or parallel to the longitudinal axis of the cylinder, when the piston is at the beginning of its power stroke, and the other leg of the bell crank then projecting at right angles to the first leg and in the direction of rotation of the crank, and being connected to the lower end of the connecting rod.

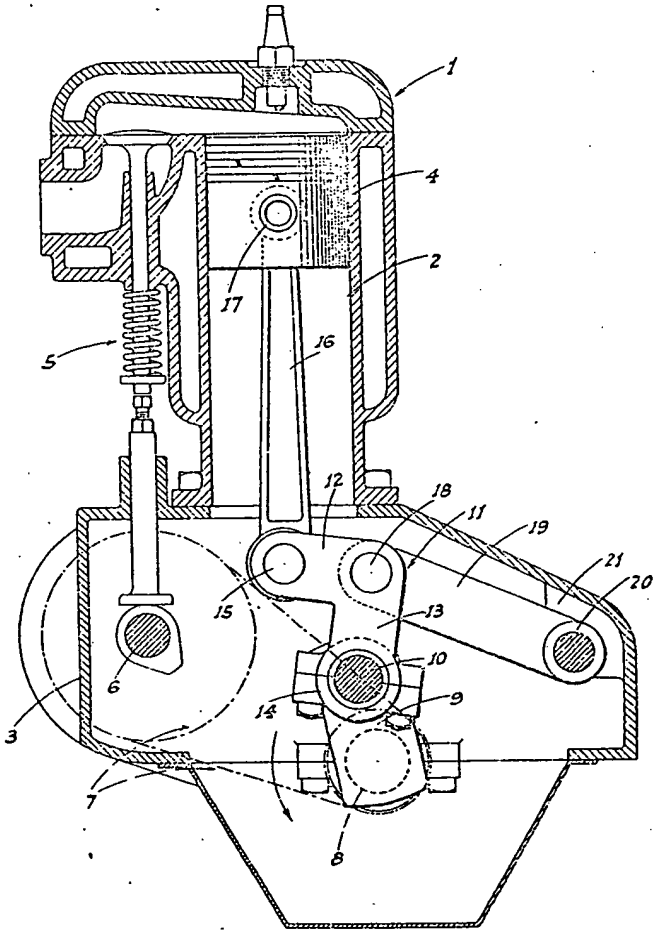
2. An internal combustion engine in accordance with claim 1, in which the crank shaft is laterally offset relative to the cylinder.

3. An internal combustion engine substantially as described in the specification and shown in the drawings.

For the Applicants:
GILL, JENNINGS & EVERY,
Chartered Patent Agents,
51/52, Chancery Lane, London, W.C.2.

Leamington Spa: Printed for Her Majesty's Stationery Office, by the Courier Press.—1952.
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained.

Fig. 1



678,677 COMPLETE SPECIFICATION

2 SHEETS This drawing is a reproduction of the Original on a reduced scale.

SHEETS 1 & 2

Fig. 2